

REMARKS FOR ADMINISTRATOR BOLDEN
INTERNATIONAL ASSOCIATION FOR THE ADVANCEMENT
OF SPACE SAFETY

May 19, 2016

Thank you, Mr. [Mark] Glissman for your very kind introduction. It's a pleasure to be here. I also want to thank IAASS President Isabelle Rongier for guiding this organization in all the good work it does.

You know, since I've become NASA Administrator, there has been an incredible expansion of our capabilities, and our vision. When I started, commercial space was a concrete program, but its future was still a foggy notion. I don't think anyone would have predicted 7 years ago that today we'd not only have two fully functional commercial resupply partners, but that they would already be critical components in our ISS supply chain.

It's also important to note that both of them have recovered from mishaps, which is the true test of their mettle and ability to learn from mistakes, correct them and get better. Nor would we have guessed that a third commercial cargo partner would have been added for the second phase of the program to resupply an International Space Station that we've now committed to through at least 2024.

In commercial crew, it also was not a foregone conclusion that we would be successful, but now The Boeing Company and SpaceX are well into the development of their crew transportation systems, we've let contracts for those services, astronauts are training for the first test flights and next year, NEXT year, is our targeted first launch of each of these vehicles. *Dragon* and *Starliner* are the new names that will go down in history along with the Space Shuttle – and *Orion*! -- as the carriers of humanity's aspirations.

Wow! And commercial space is just one piece of our comprehensive and collaborative journey to Mars.

Many people may not think of commercial space vehicles and capability as part of the journey to Mars, but it most definitely is. Without this, NASA couldn't begin to look at the farther horizons with the Space Launch System rocket and the *Orion* spacecraft. Without this, we couldn't have seeded a whole new segment of the economy, giving industry the chance to use its own hard work and innovation to create jobs and new markets for their capabilities and growing the ways the next generation could become excited and inspired by the many facets of exploration. From business to science to engineering and design, there's a reflection of your passions in our modern space program.

All that said, today we're focused on a very necessary topic.

The launches and the waving astronauts on TV; the incredible homecoming after a one-year mission; the prospect of humans finally traveling to Mars – none of that can happen without a strong safety presence.

I've said from day one that our commercial space transportation systems will fly only when they meet NASA's stringent safety requirements. Some fault NASA for being slow in its development programs, but a lot of that is because of our early and often focus on the safety factor. While commercial companies have moved rapidly to develop their systems, it has also been with careful insight by NASA – insuring they meet important safety milestones and conduct testing and more testing.

We've progressed at the rate at which funding allowed. We aren't going to rush the development of our commercial cargo and crew vehicles no matter how much people want it.

We really need our own U.S. crew transport capability because we should not be totally dependent on our Russian partners and we should not have to continue paying an increasingly high rate for seats aboard the Soyuz. But I want to be very clear, once again, we won't fly until we're convinced the new commercial transportation systems meet our safety requirements.

Our teams are working hard to ensure the safety standards for our Commercial Crew Program are consistent with our Exploration Program's safety standards and where there are necessary differences we understand and acknowledge those differences (e.g. Deep space long duration vs. LEO short duration safety criteria).

We have 50 years of history launching humans to space, and there's an incredible knowledge base in there. Believe me, our commercial partners are making use of it. We've always been about lessons learned – both good and bad.

In our history, every mishap, whether involving crew or not, has always made us stronger, more resilient and with one more dataset to help us be safer in the future.

I've lost friends and colleagues in space accidents. I don't want anyone else to have to go through that. The bottom line is that space travel is extremely difficult and risky. It always has been and always will be and there's no way to make it risk free any more than getting into your car and driving down the highway is ever going to be 100% safe.

But that doesn't mean that we don't try our hardest to continually minimize risk; that we don't check and re-check and that we don't encourage everyone to speak up when they don't think it's safe to proceed. I've worked hard in my tenure to develop a culture of safety at NASA where dissenting voices are heard and considered. It's not a catch all, but it's another check and balance and in our business, that's essential.

So, our partners have begun tests of their launch abort systems. The rockets on which their spacecraft will fly also are being tested. The list of things to overcome to make commercial crew a reality is extensive, as you can imagine, but I am confident in our partners' abilities and their commitment to safety is just as strong as ours is.

Because the market in low Earth orbit is going to be deeper and broader than just NASA, there's going to be an increasing need for cargo, and yes, for human transportation in the coming years. So all of us are working to get it right here on the ground floor. NASA's horizon mission may be Mars, but that doesn't mean at all that we're taking our eyes off of LEO and the work of our commercial partners.

As I mentioned, the work of our commercial partners is essential to getting to Mars.

Our stepping stone approach involves getting the most out of the International Space Station (ISS), where we're learning to live and work in space for the long term, making breakthroughs in human health and demonstrating technologies for traveling farther. From there, we'll shake out some of the cutting edge new technologies such as solar electric propulsion in the proving ground of the regions around our moon (cis-lunar) and out in deep space. This will phase will involve missions using *Orion* and the SLS to cis-lunar space and to an asteroid and then we get to the Earth independent phase when we finally make the decision to move our missions out to the Martian region and to its surface. That's going to be a huge international undertaking where everything we need we'll either have to take, make enroute or send on ahead. From Mars, Earth will no longer be a matter of hours or days away and many challenges will have to be solved by our technology and our human ingenuity millions of miles and months away from home base.

It's daunting, but exciting! The journey to Mars is the biggest thing humanity has ever undertaken and it's thrilling to think that somebody in my granddaughters' generation, maybe even one of them, will be the first humans at Mars.

So that stepping stone approach builds on our capabilities and expands the uses of each milestone as we go and our culture of safety must always be present in every phase of this journey.

I mentioned our international partners and it will be critically important that they're equally as concerned about safety as we are. Our astronauts in space are our most precious resource up there. They represent our brightest, most talented individuals and they're selected in a highly competitive process. At NASA, for instance, we received 18,300 applications for our last call for astronauts this past February.

We'll make the selection of the Class of 2017 next year, but the previous Class of 2013 astronauts numbered 8, selected from some 6,800 applications, so you get an idea of the level to which these folks are scrutinized for their skills, talents, passion and dedication. By the way, Class 2013 was the most diverse group we have ever selected for anything with 4 women and 4 men.

Your organization awarded us the IAASS Safety-by-Design-Award in 2013 for the International Space Station as one of the safest and most successful space programs in history and we're very proud of that. Because it took a lot of work and consensus building and it acknowledged that whatever we do, if nothing else, we operate with a strong safety consciousness out of an abundance of caution.

There have been a lot of space-related movies lately, from *Gravity* to *The Martian* that depict astronauts in danger.

But beyond the science fiction -- and we often work with producers to help make their stories as accurate as possible -- the common thread is that there were multiple systems in all these scenarios for astronauts to ensure their safety, even if sometimes they had to jury-rig them. That is a fact!

At the end of the day, our men and women in space are going to have to rely on their wits and training, but we can give them the benefit of the very best technology, the most thorough testing and the strongest chances for safe missions.

A lot of experts at this gathering are going to give you much more detailed insight on the broadest picture of safety in space, from orbital debris mitigation, to getting into and returning from space and to living on other planetary bodies. What I want to emphasize, though, is that I believe our future is very bright. We will continue to push the envelope because we have to.

More and more partners, both in industry and with other nations are going to require new ways of thinking and our journey to Mars is the biggest thing humanity has undertaken. The hard won knowledge of the past is going to have to be applied to new systems and new missions that were not even conceived when first we began this long journey to space.

It's a journey that really has no end, so we will continue to be teachable. To move forward in a sustainable manner even as political winds come and go and budgets sustain or change, what is inalterable is our desire to explore. The sacrifices of the men and women who have come before will never be forgotten and the practical, day to day challenges of making space as safe as possible, will never be overlooked. The passion and commitment that you in IAASS bring for establishing and maintaining a strong safety mindset and culture of safety must remain strong.

At NASA and among our industry and international partners, we must follow the example you set in each and every one of our programs whether they involve humans or robotic systems.

It will be essential that we all serve as safety officers in our individual work sites and our leadership must be committed to promoting safety as every level of effort. This we must and will do – I promise you that.

Thanks so much for allowing me to join your forum this morning and God Speed!

Thank you.